

Traffic

Purpose

Your system supplier assessed your needs and installed your system with the necessary components to provide your end users with an excellent level of service.

You can use traffic study data to monitor a number of things after the system is installed. Use the data to:

- ◆ monitor the performance of the system shortly after it is installed to see what level of service the system is providing during your actual workday situations
- ◆ monitor ongoing system performance after installation, when telephones and trunks have been moved, added or removed
- ◆ assess training needs of the users and attendant(s)
- ◆ provision for forecasted growth or downsizing of the system and other major predictable changes

Setting up

Every system can print Traffic studies, once the following tasks are done:

- ◆ the studies must be scheduled
- ◆ the particular study options that you want to run must be selected
- ◆ the system must be programmed with instructions as to where to print out the traffic study data

The overlay program for scheduling and selecting the study options is overlay program (LD) 2. Talk to your system supplier about how to schedule your Traffic studies. There is more information on setting up Traffic studies later in this module.

Traffic

Your system supplier can configure a Serial Data Interface (SDI) port on your system to output the traffic study data to a printer or PC set up for this purpose. This is done in the Configuration Record, LD 17, the content of which is beyond the scope of this book.

Using the data

Traffic studies monitor the performance of your system under typical working conditions. To fully appreciate the data offered by a traffic study you must be aware of the way the system works. If you require information on your system, your system supplier can explain what you need to know or you can read the section called *You should know this*.

The information on Traffic studies provided here offers an overview so that you can understand:

- ◆ what types of data are presented by the most common traffic study options
- ◆ how the data can be used to improve system performance
- ◆ how the data can impact your day-to-day operations when managing the system

When you discuss a traffic study analysis with your system supplier, the information presented here can be used as a starting point in your discussion of the data.

Grade of service objectives

You must decide what service level (also called grade of service) objectives you have for your own system before you analyze any traffic study data.

System suppliers provision systems to meet the grade of service objectives shown in the following chart.

You can use more stringent objectives than these if you wish. If you do so, you might need additional equipment to meet your objectives.

You can use less stringent objectives, if you wish, but you sacrifice service if you do so. For example, poor service can result in a blocked incoming call, delayed dial tone for your users, or a feature which did not operate when needed. Assess the impact of poorer service on your business before you choose reduced service levels.

Table 12
Nortel Networks grade of service Guidelines

IMPORTANT

Type of service	Maximum blockage objective (%)
incoming calls	1
outgoing calls	1
intracustomer calls	4
tandem (trunk to trunk) calls	1
less than 3 sec. wait for dial tone	1.5

The guidelines are objectives against which you can measure your system performance.

A traffic study is usually conducted over a period of a week and the data is usually collected every hour of each business day during that week. You and your system supplier can use the data from the busiest hours of the study period to evaluate your system performance against the grade of service objectives.

Systems provisioned with tools or charts which are based on the guidelines shown above perform well within these service level objectives during normal working hours. The provisioning methods used by system suppliers usually provide sufficient capacity to allow your system to operate with an excellent grade of service, even during sporadic peaks in traffic during the busy hour.

Discuss with your system supplier what projected traffic load was used when they configured your system components. If your system was configured based on your projected busy hour traffic load, the traffic study data should be analyzed based on your busy hour statistics.

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If you find your actual busy hour traffic is consistently different from what was projected, this can lead you to reprovision components in your system in order for you to operate within the grade of service guidelines.

When to run a study

- ◆ Determine what weeks of the year are slow times for your organization and what weeks are the busiest (Busy Season).

During the busiest times, your system is handling its greatest call volumes.

If you do not understand the traffic patterns on your system well enough to determine your Busy Season, ask people who might know. Some people you might ask are the attendant(s), executives, sales people, and secretarial staff.

- ◆ Decide what call volume your system is expected to handle and still meet the grade of service objectives. Choose one of the following types of *Busy Hours*:
 - the busiest hour during the busiest week (also called the Peak Busy Season Busy Hour)
 - the average of your five busiest hours, one busiest hour from each day during a busy week (also called the Busy Season Average Busy Hour)
 - the busiest hour during an average busy week (also called an Average Season Busy Hour)

If you provision your system to handle the traffic load during your absolute busiest times, this guarantees excellent service for incoming and outgoing calls. Internal users and external callers will not encounter blocking even during peak traffic periods.

If you provision based on a study which is run during an *average* busy time, there might be peak busy times when the recommended grade of service objectives will not be met. Evaluate the potential costs to your organization which would result from blocked calls and features before you decide to do this.

- ◆ Prepare your system supplier with sufficient time and information to set up a traffic study, and analyze the data if they are conducting the traffic study for you.

If you have deadlines you are trying to meet, they need to know what they are. If you are preparing a budget for possible new equipment purchases based on the study results, or if you are expecting immediate increases in call volumes due to increased business, give them that information. It affects the recommendations they will make about your equipment.

- ◆ Decide how often you want to run a study.

It is a good policy to run a minimum of one study annually.

If your organization is changing rapidly and this is impacting your calling patterns, your system should be monitored more frequently. Your system can be configured in advance to handle predictable changes to your volume of calls and use of features.

If your system supplier is running the studies for you, there may be a charge associated with more than one annual study.

If you intend to do your own traffic study analysis, after receiving some training, assess the time it will take to do the study against the benefits you will achieve.

- ◆ Discuss setting up traffic threshold levels with your system supplier. Instead of running complete studies, the system can be programmed to print out messages any time these traffic-related thresholds are violated. Along with the threshold violation message, it prints out enough traffic-related data to help you analyze the source of the problem. You and your supplier can coordinate a procedure for using this method to monitor the traffic on your system.

There is more information on these threshold settings and traffic studies in general in *Traffic measurement formats and output*.

Traffic

Terms you should know

Peg count

Many of the traffic study options are designed to keep a tally of how often certain events occur. *Peg count* is another word for tally.

Usage

Many of the traffic study options are designed to keep a record of the duration of certain events. *Usage* is the term used for a measurement of the length of time which a certain type of event lasted. The traffic program itself measures usage in two second increments.

Some study options are designed to print out the usage data in units of seconds and others print out in units of CCS (see the definition of CCS to follow).



It is very important that you pay close attention to the usage units used in each study option if you are analyzing the data yourself.

CCS ("Centa" Call Seconds)

Centa is a Latin word for one hundred. CCS is a unit of time measurement equalling 100 seconds.

As call volumes increase, and usage times increase, the usage data numbers get very large. Therefore, the CCS unit is used to shorten the number of digits in the data being presented.

For example, if usage on a certain trunk group during a study hour is 66,000 seconds, the usage data in the traffic study for trunk group usage prints out as 660 CCS.

FTM (Failure to match)

The first SL-1 family of *Standard Network* systems used a system of pairing when it assigned two timeslots to a conversation. The timeslots in a pair had to have consecutive numbers and the odd number in the pair had to be the higher number of the two. The timeslots were said to *match*.

When the system attempted to connect two telephones for a conversation, and was not able to find two available *matching* timeslots, it would register a *Failure to Match* in the Traffic data to indicate a call had been blocked. More information on timeslots is in the *You should know this* section.

Systems in the later Meridian SL-1 and Meridian 1 families are equipped with *Enhanced Network loops* and *Superloops*. They do not require matching timeslots to establish a call. However, if the system cannot find *any* timeslots available in order to set up a connection because they are all in use, it still registers this problem in the traffic study data as a Failure to Match.

Many of the traffic study options explained in the following pages are designed to monitor system performance by indicating the number of Failures to Match during a study period.

Consistently high numbers of FTMs can indicate one or more of the following things:

- ◆ the need for more components, to get more timeslots for certain functions
- ◆ the need to reposition components in the system to prevent timeslot problems
- ◆ the existing component(s) are defective

Traffic

Traffic study options

The study options included here are discussed from the following points of view:

- ◆ what a study can quickly tell you about system performance
- ◆ what you can do with the data to improve the system performance
- ◆ how you can interpret the data in different ways
- ◆ what questions you can ask when analyzing a study
- ◆ how you can relate some study results with problems that have been reported
- ◆ how you can use the results to improve training programs that you are running
- ◆ how you can use the traffic study data to do day-to-day moves, adds and changes more efficiently
- ◆ how you can use the traffic study data from your system to provision other systems in your network properly before they are installed

System, Customer, Network traffic studies

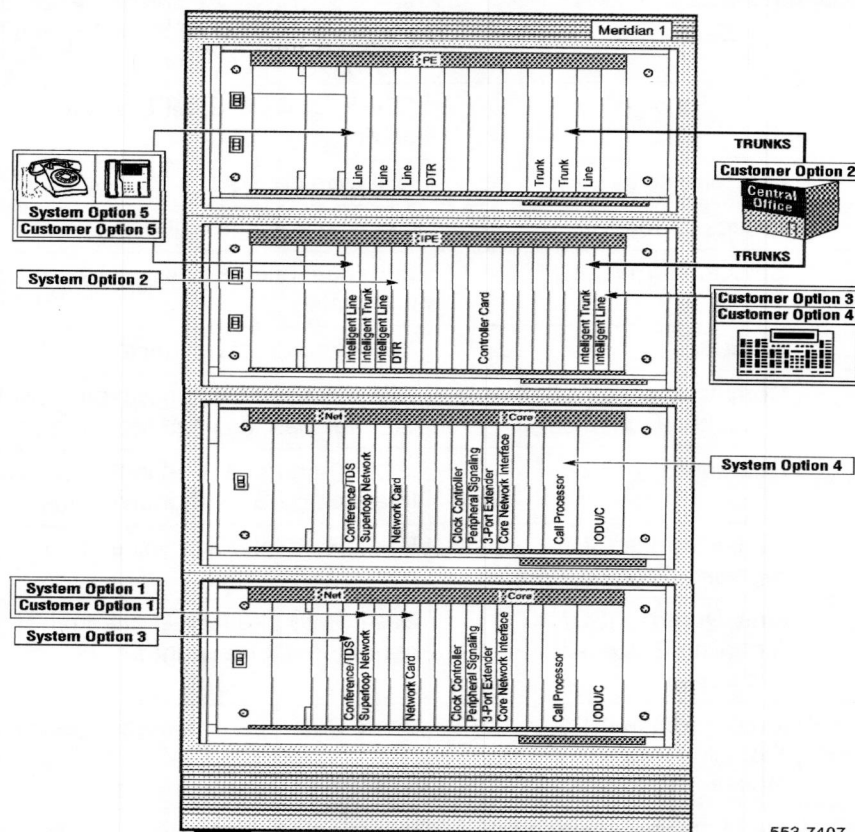
System and *Customer* traffic study options come with every system. There are some options that print out data only if you have certain software packages present on your system disk. The optional studies are specifically identified when they are presented here.

Network Traffic (NTRF) is an optional software package that you would probably order if you have some of the Electronic Switched Network software packages such as Basic Automatic Route Selection (BARS), Network Alternate Route Selection (NARS), or Coordinated Dialing Plan (CDP). Network traffic studies monitor the performance of network features such as least cost routing and queuing. Further information on these options is provided in the *Software System Management Guide*.

Understanding what these traffic study options deliver can have a bearing on how you perform the moves, adds, and changes of telephones on your system.

All of the traffic study options are described in *Traffic measurement Formats and output*.

Relationships between System and Customer traffic studies and system components



553-7407

Upgraded Option 61C system

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System traffic study options

The following table provides a complete list of the traffic study options available for studying the *System*. A similar table for the *Customer* traffic study options is presented later in this module.

Table 13
System traffic study options

Option number	Option name	Major focus of study
TFS001	Networks	Loops, (including TDS, CONF and MFS loops) and Superloops
TFS002	Service loops	CONF, DTR, TDS, MFS and tone detectors
TFS003	Dial tone delay	Dial tone delays
TFS004	Processor load	CPU, buffers and call registers
TFS005	Selected terminals	Individual telephones, trunks, and data terminals
TFS007	Junctors	Multi-group system junctors
TFS008	Command status link & Application module link	CSL link used for Application modules like Meridian Mail and Meridian Link
TFS009	D-channel	ISDN D-channel used in Primary Rate Interface or ISDN Signaling Link
TFS011	Multi-Purpose ISDN Signaling Processor traffic	Basic Rate Interface voice, data, or packet data traffic
TFS012	Multi-Purpose ISDN Signaling Processor D-channel	Basic Rate Interface D-channel management messages
TFS013	Multi-Purpose ISDN Signaling Processor messages	Basic Rate Interface messages by size
TFS015	Meridian Packet Handler	Incoming and outgoing calls handled by the packet handler and the data packets

The information in this book focuses on the five System options which are the most useful for system administrators of all systems. They are:

- ◆ TFS001
- ◆ TFS002
- ◆ TFS003
- ◆ TFS004
- ◆ TFS005

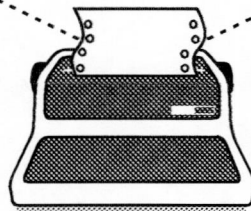
Traffic

TFS001 – Networks

Sample data

System TFS001 ID							
Loop number	Loop type	Intraloop FTM	Intraloop CCS	Intraloop peg count	Total loop FTM	Total loop CCS	Total loop peg count
200	TFS001						
004	TERM	00000	0000142	00161	00001	0002056	01652 S
008	TERM	00000	0000184	00180	00001	0002500	01725 S
012	TDMS	00000	0000000	00000	00013	0000031	01496
013	CONF	00000	0000000	00000	00000	0000010	00006
014	TERM	00000	0000085	00060	00006	0000544	00287
015	TERM	00003	0000064	00039	00014	0000372	00284

The headings shown in this example do not
appear in the printout.



533-0300T TTY

This study prints out the usage data in units of CCS.

Purposes of TFS001 study

TFS001 is one of the most useful study options you can run. It monitors the performance of the loops and Superloops on your system. The types of loops it monitors include:

- ◆ Terminal (Network Controller loops and Superloops)
- ◆ Tone and Digit Switch loops
- ◆ Multi-Frequency Sender loops
- ◆ Conference loops

The data for Superloops is identified with an "S" in the Total loop peg count column to differentiate it from the data for loops.

For each type of loop or Superloop there is one line of data output. Each line of data includes:

- ◆ a peg count of the number of times that timeslots were used
- ◆ a measurement of the total usage time of those timeslots
- ◆ a peg count of the Failures to Match (FTMs), times when there were no suitable or available timelots

One line of data is highlighted in the previous example printout.

Explanation of terms used

Timeslots

When a user attempts to call another user, the system Central Processing Unit (CPU) connects the telephones for the conversation by assigning one timeslot for each of the two telephones.

The loops which serve the telephones each have 30 timeslots to use for voice and data connections for all of the terminals that share that loop. The terminals can be telephones, trunks, attendant consoles, data devices and digitone receivers.

TFS001

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Superloops have 120 timeslots to provide for voice and data connections for the terminals connected to them. It is important to note that with four times more timeslots than a loop, a Superloop can carry *five* times the amount of traffic. You will see more about that in the recommended traffic levels shown in Table 14 which follows.

When establishing a connection, the CPU must find one timeslot on the originator's loop or Superloop and one timeslot on the destination terminal's loop or Superloop. If either loop has no available or suitable timeslot, this traffic study, TFS001, shows FTM peg counts for the loops for *both* telephones attempting the connection. If one loop is too busy and is causing problems for many other loops when they try to connect with it, the FTMs will be the highest number for the loop causing the problems.

This study identifies peg counts, usage and FTMs for two basic kinds of connections, *Intraloop and Loop*.

Intraloop connections

Intraloop statistics only include the activity of terminals attempting to connect to other terminals on the same loop or Superloop.

Loop connections

Loop statistics include the activity of any terminal on that loop or Superloop. The statistics print out when terminals connect to a terminal on the same loop or on another loop. The data includes twice the value of the associated intraloop numbers for the same loop or Superloop as well as any interloop traffic which occurred involving terminals on that loop.



If you are using loops on your system, the frequently connected terminals should be configured on different loops whenever possible and in this way intraloop connections are prevented. This helps to keep blockage (if any) within the grade of service guidelines.

If both telephones for two users who call each other frequently are connected to one loop, the probability that there will *not* be a timeslot occasionally when needed is greater than if the two telephones are connected to two different loops. There is even less chance of blockage if one or both of the terminals are connected to Superloops.

When users make calls they do not know what loop(s) or Superloops their telephones are on, nor should they concern themselves with that. It is the responsibility of the person who sets up and maintains the system to understand the calling patterns of the users of the system. Telephones and trunks and attendant consoles which interconnect frequently must be considered. The cards for these terminals should be located on different loops, or on Superloops, if the grade of service is to stay within the guidelines.

Although Superloops are able to handle very high levels of traffic, it is a good idea to monitor the load and the amount of intraloop traffic on these as well in order to achieve maximum efficiency from your system.

Avoid these potential intraloop blockage scenarios:

Scenario 1

Incoming trunks should not be connected to trunk cards which share a loop with a line card connected to an attendant console.

Every time a call comes into the console from one of the trunks, the system must find two timeslots on one loop for the call to be answered (one for the trunk side of the call and the other for the attendant to use).

Symptom of blockage: If blockage occurs, the caller experiences many rings before the call gets answered. The attendant does not show any call waiting.

Solution: Reduce potential intraloop traffic congestion by moving a trunk card or the attendant console line card to a different loop with low traffic.

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Scenario 2

A manager's telephone should not be connected to a line card which shares a loop with the line card connected to that manager's secretary's telephone.

Symptom of blockage: These users, or others on the same loop, experience delayed dial tone or call blockage when they attempt to make calls.

Solution: Move one of the two telephones which frequently connect to each other to a different loop with low traffic.

Scenario 3

Digitone receiver cards should not be connected to a loop with a high number of Digitone-type telephones. Every time a Digitone-type telephone goes off-hook, it requires a connection with a digitone receiver. If the two are on the same loop, this ties up timeslots and deprives other users on that loop for the duration of the dialing period.

Symptom of blockage: All users on the loop with the Digitone-type telephones and the digitone receiver card could experience dial tone delays, most often in the busy hour(s).

Solution: Move the digitone receiver card to a different loop with low traffic and few Digitone-type telephones.

How can you ensure there will be timeslots available for the terminals when they need them?

- ◆ Configure your system so that there is very low *intra*loop calling. When users call each other and use the trunks, they should be making *inter*loop connections the majority of the time.
- ◆ Distribute the total system traffic across all loops or Superloops as much as possible ($\pm 10\%$). If any loop or Superloop carries a disproportionate amount of the total traffic of the system, maximum system performance will not be achieved.
- ◆ Keep your traffic levels below the recommended levels of maximum traffic for loops and Superloops.
- ◆ Set a Loop traffic threshold at less than the recommended capacity so that if any loop or Superloop reaches the threshold level, you will see warning messages on the traffic study printer. In this way, you can prevent any loop or Superloop from getting overloaded and you maintain excellent service to your users at all times.

Table 14
Recommended traffic levels

Type of loop	Maximum traffic (ccs per hour)	Recommended traffic (ccs per hour)
Standard	1080	600
Enhanced	1080	660
Superloop	4320	3500

Traffic

Note 1: Standard Network SL-1 System Types: L, LE, VL, VLE, XL, M, MS, S)

Note 2: Enhanced Network Meridian SL-1 System Types: N, XN, ST, RT, NT, XT

Note 3: Enhanced Network /Superloop Network Meridian SL-1 System Types: ST, RT, NT, XT,

Note 4: Enhanced Network /Superloop Network Meridian 1 Option 11, Option 11E, Option 11C, Option 21, Option 21E, Option 51, Option 51C, Option 61, Option 61C, Option 71, Option 81, Option 81C.

See the section called *You should know this* for more information on these system types.

Use the recommended traffic levels in the preceding chart to analyze the traffic study data from your system. If your loops and Superloops consistently carry more traffic than the recommended levels, this may result in Failures to Match (FTMs).



If you see traffic reports which show peg counts for Failures to Match, calculate whether your system is meeting the grade of service objectives first, before you plan any changes to your system. Use the data from Customer traffic study TFC001 to do that. See the section on TFC001 which follows.

Find out if Failures to Match are showing up consistently before you react by making system changes.

Situations you might encounter

Situation:

All loops and Superloops are carrying the maximum recommended traffic and there are too many FTMs; you are not meeting your grade of service objectives.

Solution:

You need more timeslots. Order at least one additional loop or Superloop card and have your system maintainer redistribute the system traffic once the additional card is installed.

Situation:

You are adding several new telephones, or trunks, or data terminals, or a console, (in other words you are about to add more traffic to your system). You must connect them to available TNs.

Solution:

Use recent traffic study data to help you select the best TNs to use. Terminals should *not* be added to loops which are already experiencing FTMs.

It helps your system maintainer(s) with day-to-day moves, adds, and changes if you discuss study results with them. They need to know the statistics on the loops which are very busy and those which have low traffic.

When they have an opportunity, cards from very busy loops can be moved to loops which have low traffic to keep the traffic spread evenly over the entire system.

Arrange with your system maintainer to set up Traffic threshold settings. There are thresholds for incoming or outgoing call blockage, percentage of all trunks busy, attendant speed of answer, and loop or Superloop traffic, to name a few. For example, if loop traffic exceeds a threshold level, warning messages print out along with traffic study data. With thresholds set up, complete studies are not required as often since the system monitors itself and prints out warnings whenever violations occur.

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Estimating traffic

If you do not have recent traffic study data and you have not been monitoring for threshold violations, you can do an estimate of the traffic on each loop by assigning average usage values to the various types of terminals on your system.

- ◆ Estimate or have different users estimate, how busy (in seconds) each type of telephone is in its busiest hour. You can also use Internal Call Detail Recording, if you have the software package, to record the call activity of various typical telephones.
- ◆ Remember to include trunk traffic and the traffic on your digitone receivers (DTRs) when you are estimating. Use Call Detail Recording information for the trunk estimates. Ask your system supplier for help estimating the DTR traffic.
- ◆ Calculate how many terminals of each type are on each loop. Do a TN Block print out to verify all the terminals connected to each loop or Superloop.
- ◆ Multiply the usage per terminal, times the number of terminals per loop, to calculate the average estimated traffic per loop or Superloop in its busiest hour.

The following example illustrates this exercise. The averages used in the example are not to be taken as suggestions. Use your own traffic values in your calculations.

Table 15
Example of traffic estimate

Type of terminal	Type of connection	Busy hour estimate
Digital telephone	voice	800 seconds (8 ccs)
	data	1800 seconds (18 ccs)
Analog telephone	voice	600 seconds (6 ccs)
— continued —		

Table 15
Example of traffic estimate (Continued)

Type of terminal	Type of connection	Busy hour estimate
Data terminal	data	1800 seconds (18 ccs)
Central Office trunk	voice	3000 seconds (30 ccs)
TIE trunk	voice	3400 seconds (34 ccs)
Digitone receiver (DTR)	Digitone	3400 seconds (34 ccs)

Table 16
Example of one loop traffic estimate

Card type & Quantity	Terminals working	Traffic volume
digital line cards (2)	12 telephones	96 ccs
	3 data terminals	54 ccs
analog line cards (4)	30 telephones	180 ccs
data line card (0)	—	—
COT trunk cards (2)	6 trunks	180 ccs
TIE trunk card (1)	2 trunks	68 ccs
DTR card (0)	—	—
Total traffic:		578 ccs

Compare this amount of estimated traffic with the recommended levels shown earlier in this section.

- ◆ Decide whether more terminals can be added to this loop or Superloop.
- ◆ Decide what types of terminals can be added, based on their estimated traffic load in the busy hour.

Traffic

Service loops

The Tone and Digit Switch, Conference, and Multi-frequency Sender loops are called Service loops collectively. If there are times when timeslots were not available for one of the services provided by these cards, there will be FTMs pegged under the service type that was blocked.

Users of the system who experienced the blockage may also mention this to you. For example, they may have had problems with the Conference feature during a busy hour if the CONF loop showed FTMs in the traffic study print out. Look for more detail concerning the problem by analyzing studies TFS002 and TFS003, to be discussed later in this section.

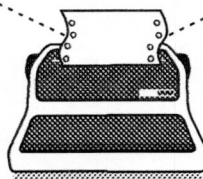
It is important to note that if the telephone on a very busy loop with no available timeslots requests a service such as dial tone, two FTM peg counts will print out, one for the telephone's loop and one for the TDS loop.

Since the interpretation of this data related to Service loops is rather advanced, it is best to discuss the data with your system supplier.

TFS002 – Service loops**Sample data**

System ID	TFS002		
Service number	Service FTM	Service usage	Service request peg count
200	TFS002		
000	00002	0000023	01650
001	00000	0000003	00099
002	00002	0000008	00321
003	00002	0000057	00951
004	00000	0000010	00168
005	00000	0000005	00068
006	00003	0000044	00376
007	00000	0000000	00000
008	00013	0000076	01471
009	00000	0000013	00069
010	00000	0000002	00012
011	00000	0000000	00000
012	00000	0000002	00022
013	00000	0000001	00003
014	00000	0000000	00000

The headings shown in this
example



533-0300T TTY

This study prints out the usage data in units of CCS.

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Purposes of TFS002 study

Tone-related hardware

The cards looked at by this study are:

- ◆ Conference
- ◆ Digitone receiver (DTR)
- ◆ Tone and digit switch (TDS)
- ◆ Multi-frequency sender (MFS)
- ◆ Tone detector

Study option TFS002 monitors the performance of the Service loops in detail and also related cards which are involved in providing services.

The major uses of this study are:

- ◆ finding out the number of requests for dial tone there were in order to calculate the percentage of users who waited for dial tone

In order to calculate the percentage wait for dial tone, you need data from study TFS003. This calculation is included in the discussion of the TFS003 study which follows.

- ◆ finding out the usage of the DTRs in order to assess whether they are properly provisioned for your requirements
- ◆ finding out if there are FTMs on these cards which could mean improper provisioning, defective cards or poor traffic balance on your system. This data can also help explain repair calls related to these services during the same time period

Services by number

Each service provided by these cards, has been assigned a number:

- ◆ 000 Dial tone
- ◆ 001 Busy tone
- ◆ 002 Overflow tone
- ◆ 003 Ringback tone
- ◆ 004 Tone ringing Meridian 1 telephones
- ◆ 005 Miscellaneous tone
- ◆ 006 Outpulsers
- ◆ 007 Spare
- ◆ 008 Digitone receiver
- ◆ 009 Conference
- ◆ 010 MF tone for Automatic Number Identification (ANI)
- ◆ 011 Meridian 1 Tone Detector
- ◆ 012 Multi-frequency Sender
- ◆ 013 End-to-End Signaling TDS usage (Release 19 and later)
- ◆ 014 End-to-End Signaling conference usage (Release 19 and later)

DTR usage

Your system supplier can help you calculate the number of DTRs your system requires during the time period you have chosen. To do this they use the usage and peg count data shown in the study for service number 008.

A Digitone telephone requires a DTR anytime it is used to make a call. If none is available, the user is not given dial tone until there is one. Insufficient DTRs impact users of Digitone telephones and incoming trunks only.

TFS002

Traffic

Using provisioning tables, which your supplier has, they can calculate how many DTRs are required to provide a good grade of service for dial tone for the Digitone users of your system.

FTMs

If there are Failures to Match for any of the services in this study use the data from TFS001 if you have it to help analyze the numbers.

FTMs are often explained by overloaded loops. Redistributing traffic load can remove the FTMs from your system.

There may be a requirement for more Service loops. This would also show up in the data for TFS001.

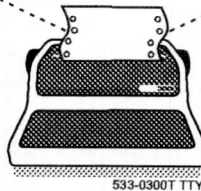
A defective card is the least likely solution. Replace the type of card with the FTMs if all the other alternatives have been tried and FTMs continue to appear in TFS002.

TFS002

TFS003 – Dial tone delay**Sample data**

System ID	TFS003	
Delay longer than 3 seconds	Delay longer than 10 seconds	Total delays of 1 second or longer
200	TFS003	
00003	00001	0040

The headings shown in this example do not appear in the printout.



TFS003

This study prints out the usage data in units of seconds.

Traffic

Purposes of TFS003 study

The data provided by study option TFS003 can be used to calculate whether your system is meeting the grade of service objective for dial tone delay.

The standard objective is: *no more than 1.5% of users should experience a 3 second wait for dial tone during the busy hour.*

Calculate the percentage dial tone delay

Use the number of dial tone requests shown in the TFS002 study data for the same period. That number is the peg count shown for service 000. The line of data is highlighted in the example printout.

Calculate your percentage as follows:

TFS003 peg count for delays longer than 3 seconds divided by the TFS002 peg count for service 000 dial tone requests.

Multiply this number by 100% to get your percentage. Compare this to the objective of 1.5%.

If you are not meeting your objective you may need

- ◆ more TDS loops
- ◆ more DTRs for Digitone telephones and incoming trunks
- ◆ more units on your existing DTR cards activated in software
- ◆ more loops or Superloops
- ◆ repairs
- ◆ a faster CPU to keep up with all the dial tone requests

Your system supplier can help you investigate the cause of these delays.

$$\text{OBJECTIVE} = \frac{00003}{01650} \times 100\% = 0,03921569 \quad \checkmark$$

Traffic

On an ongoing basis, you can monitor the delayed dial tone percentage without doing the manual calculation. Set a *dial tone delay threshold* and if this is ever violated, the system prints out a warning message to the traffic printer along with the traffic study data which you can use to analyze the situation.

TFS003

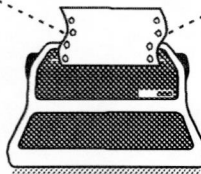
Traffic

TFS004 – Processor load

Sample data

System ID	TFS004	
Idle cycle count	CPU attempts	Load peak peg count
HPIB overflow peg count	LPIB overflow peg count	
500/2500 Output buffer overflow peg count	SL-1 Output buffer overflow peg count	
Call register overflow peg count		
Rated call capacity	Maximum call capacity used	Percentage of call capacity used
Number of eliminated observations	Day, hour of maximum call capacity used	
LLC1 blocked calls	LLC2 blocked calls	LLC3 blocked calls
200	TFS004	
1474233	21786	00141
00000	00000	
00000	00000	
00000		
00000	00000	00000
00000	0000	
00000	00000	00000

The headings shown in this example
do not appear in the printout.



533-03001 TTY

Purposes of TFS004 study

The focus of study option TFS004 is the Central Processing Unit (CPU) and memory of your system.

- ◆ You can use it to see how well your CPU is keeping up with call processing demands, especially during the busy hour.

Call capacity is the term used to describe the amount of processing power your CPU has. As of Release 18, one of the fields of data in TFS004 shows the percentage of call capacity used during the study period. The nearer this number is to 100% the more likely it is that users are experiencing delays in getting dial tone, feature related problems, and you are seeing such things as missing Call Detail Records. Since the CPU controls the system, if it is running at maximum capacity, symptoms appear in all areas of call processing. Systems running at a maximum call capacity of approximately 70% are able to handle peaks in call traffic efficiently, during the busy hour.

In Release 24, the *Rated call capacity* and the *Maximum call capacity* used is based on data collected for the last seven days, 24 hours a day (168 hours), rather than the previous 24 hours only. If the system initializes or SYSLOADS, there will not be data in these fields for the first 24 hours. The *Day and hour of maximum call capacity used* is the date and hour with the highest Call capacity used over the past 168 hours. For example, DDHH = 1613 means the maximum call capacity used occurred on the 16th of the month at the 13th hour.

TFS004

Traffic

Note: If your system is running on software of an earlier release than Release 18, ask your system supplier to manually calculate the percentage of real time used from the data in the busy hour study and another study which runs when there is no activity on the system.

- ◆ You can look at the data for buffer and call register overflows to evaluate the provisioning of memory for these functions.

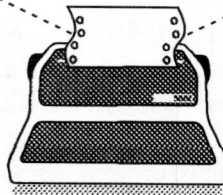
After installation of your system, your system supplier can use the data from the first study with the system running under a normal load to adjust the provisioning slightly if required. Ideally, there should never be buffer or call register overflows since they indicate a lost call, feature, or Call Detail Record.

- ◆ If you are using the Line Load Control feature, you can monitor the blocked call attempts when you have turned the feature on during a study period. For more information on Line Load Control see *X11 software features and services*.

TFS005 – Selected terminals**Sample data**

System ID	TFS005	
Loop number	Line usage	Line peg count
200	TFS005	
00	00000144	00066
01	00000213	00179
02	00000232	00144
03	00000244	00130
05	00000289	00124
08	00000218	00158
10	00000229	00154

The headings shown in this example
do not appear in the printout.



533-0300T TTY

This study prints out the usage data in units of CCS.

Traffic

Purposes of TFS005 study

The data in study option TFS005 allows you to monitor selected terminals for the number of calls they make and the traffic load they offer to the system.

The terminals can be individual trunks or telephones. *They cannot be attendant consoles.* Refer to the sections on Customer Options TFC003 and TFC004 for the study options designed to monitor consoles.

The data you collect in this study can be very useful when you move, add, and remove terminals from your system.

- ◆ When you do any of these things, the traffic load of the system and each loop or Superloop is changed.
- ◆ You need to know, before you add terminals, how much traffic each one will add to the system if you are going to distribute the traffic as evenly as possible over the entire system.
- ◆ If several TNs are available for a new trunk or telephone, you can choose the best one to use, from a traffic point of view, if you understand the traffic on your existing loops or Superloops and how much the new terminal will add.

You can use this study to find out how much traffic, on average, each different kind of trunk or telephone user adds to the system. For example, a sales person might use the telephone far more than other kinds of users. You need to know the calling patterns of the various kinds of users you have on your system. Use this study to get that data.

The same thing applies to the different types of trunks you might be using. TIE trunks to other systems on your private network might be used frequently, whereas Foreign Exchange trunks might not be so busy.

Some individual trunks are used more often than others. For example, the trunk with the highest member number in a trunk route is used more often than the trunk with the lowest member number, if your system is programmed to scan trunks in a linear fashion.

If you can get this level of detail about the traffic on each type of trunk and telephone, you can use it along with data from a recent TFS001 (Networks) study to plan a major change to your system. Also, you can use it to estimate the traffic on each loop or Superloop if you have no recent TFS001 data when you make day-to-day changes to your system. You will be able to provide your users with the level of service they need, managing the traffic on the system, while you perform moves, adds and changes.

If you have other systems on your network with users who are similar to the ones on the system you are managing, you can use the data collected for this study to help the other manager with provisioning and management decisions.

If a new system is being installed, knowing the number of terminals and the traffic expected from them in detail allows you and your system supplier to configure loops and Superloops extremely well for the needs of the terminals to be connected.

Set up

- ◆ Select typical users in each functional group on your system.
- ◆ Ask your system supplier to monitor the traffic for them long enough to get busy hour data which represents typical calling patterns for each one.
- ◆ Do the same for average busy trunks or busy/not busy trunks in each trunk group on your system.
- ◆ Your system supplier knows that if you simultaneously monitor two terminals on the same loop or Superloop, this study combines the data for both terminals. You would do this to calculate an average traffic value. If you do not want the data combined, you must ensure that you are monitoring only one terminal from each loop or Superloop individually to get pure data.

Traffic

Other System traffic study options

TFS007, TFS008, TFS009, TFS 011, TFS012, TFS013 and TFS015 are the remaining System traffic study options. The content of these studies relates to optional system components and some of them also require optional software packages. They are beyond the scope of this book.

For further information on them, ask your system supplier or refer to the *Traffic measurement formats and output*.

Customer traffic study options

Table 17
Customer traffic study options

Option number	Option name	Major focus of study
TFC001	Networks	Calls by type (incoming, outgoing, tandem and intracustomer)
TFC002	Trunks	Trunk group activity
TFC003	Console queue	Calls in attendant queue
TFC004	Individual consoles	Individual attendant activity
TFC005	Feature key	Use of feature keys
TFC006	Radio paging	Radio paging system
TFC007	Call Park	Call Park feature usage
TFC008	Messaging and Auxiliary Processor links	Messaging and Auxiliary Processor links (IMS and IVMS links)
TFC009	Network Attendant Service	Calls attempting routing with Network Attendant Service

The information in this book focuses on the five Customer options which are the most useful for system administrators of all systems. They are:

- ◆ TFC001
- ◆ TFC002
- ◆ TFC003
- ◆ TFC004
- ◆ TFC005

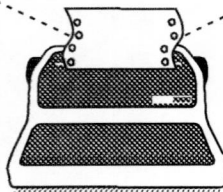
Traffic

TFC001 – Networks

Sample data

System ID	TFC001	
Customer number		
Incoming FTM	Incoming CCS	Incoming peg count
Outgoing FTM	Outgoing CCS	Outgoing peg count
Intracustomer FTM	Intracustomer CCS	Intracustomer peg count
Tandem FTM	Tandem CCS	Tandem peg count
Permanent signal	Abandon	Partial dial
200	TFC001	
000		
00001	0001985	01143
00002	0002909	01732
00003	0000339	00047
00000	0000046	00062
00001	00004	00002

The headings shown in this example
do not appear in the printout.



533-0300T TTY

This study prints out the usage data in units of CCS.

Purposes of TFC001 study

- ◆ The data in study option TFC001 allows you to monitor call activity in the customer group from the point of view of the type of call. There is a line of data for the following types of calls:
 - incoming
 - outgoing
 - intra-customer
 - tandem

For each call type, the system tracks FTMs, usage in CCS, and the peg count of the number of calls during the study period. Studies are usually run on an hourly basis.

Before running the study, you decided what grade of service objectives you wanted to use for the four call types which this study monitors. It is very common to use the recommended objectives shown in Table 12 near the beginning of this module.

You can use the data in TFC001 to calculate the percentage of FTMs relative to the peg count of the number of calls of a particular type. You can determine whether your system is meeting your grade of service objectives.

TFC001

Traffic

For example, if you look at the sample print out shown earlier for this study, you can see the line of data for incoming calls that is highlighted. There was 1 FTM and there were 1143 incoming calls during the sample hour. As a percentage this is:

$$1 \div 1143 \times 100\% = 0.08\%$$

Once you compare this percentage to your objectives, you can decide whether some system changes are required to bring your system performance in line with your objectives.

- ◆ This study also shows peg counts for such things as Permanent signals, Abandoned calls, and Partially dialed calls. The data shows the number of times telephones were left off-hook, or users did not complete dialing once they had started.

If users leave their telephones off-hook, incoming calls will not get through. This also puts an extra load on your CPU.

If the telephones are Digitone, it adds extra load onto your system DTRs as well.

Immediately after cutover these numbers might be high due to a change in dialing plans. Users need time to adjust to new ways of dialing calls and accessing features.

If these numbers remain high, user re-training might be needed, or you can walk around to see if users are leaving their telephones off-hook.

What can you learn from the data?

- ◆ The data can help to support or refute user reports of problems.

Users who experience blockage may assume there is a larger system problem than there in fact is. The FTM they experienced may have been due to unusually high levels of traffic which might not reoccur. You might also find that your system shows small numbers of FTMs consistently during busy hours, but if you are running within your grade of service objectives, it is important to be able to tell the user that.

If the user requires better service, you can have that user's telephone moved to a loop with lower traffic and, hopefully, fewer FTMs than the one they are connected to at present.

- ◆ It can help you pinpoint traffic bottlenecks in your system.

For example, if incoming calls are experiencing FTMs, your system maintainer can identify cards connected to incoming trunks or attendant consoles and focus rearrangement work on those cards and loops or Superloops. Traffic bottlenecks are not likely to occur on Superloops.

Thresholds

There are two thresholds which your system maintainer can set up to configure the system to print out a threshold violation message, when the percentage of FTMs rises above your grade of service objective.

The threshold settings are for *incoming and outgoing* calls. Decide what percentage your settings will be. If you set it slightly lower than your desired grade of service, you will be alerted before there is serious need for concern. This helps you manage the system proactively and provide excellent service to your users at all times.

TFC002

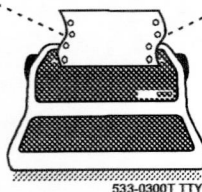
Traffic

TFC002 – Trunks

Sample data

System ID	TFC002
Customer number	
Route number	Trunk type
Trunks equipped	Trunks working
Incoming usage	Incoming peg count
Outgoing usage	Outgoing peg count
Outgoing overflow	All trunks busy
Toll peg count	
Incoming ISA peg count	Outgoing ISA peg count
200	TFC002
007	
004	COT
00008	00007
0000088	00046
0000114	00052
00001	00002
00006	
00000	00000

The headings shown in this example
do not appear in the printout.



This study prints out the usage data in units of CCS

Purposes of TFC002 study

The data in study option TFC002 is mainly used for provisioning the correct number of trunks in each trunk group. Based on the usage you actually have on each group of trunks during your busy hour(s), you and your supplier can use trunk provisioning tables or computerized tools to calculate how many trunks should be in each trunk group to provide the level of service you are expecting.

Grade of service

You must decide what grade of service, or in other words what maximum level of blockage, you can tolerate. Each trunk group can be configured individually for a separate grade of service.

For example, you might want to provision public network Central Office trunks at a 2% blockage maximum since your customers use them to call in to you. You might provision your private network TIE trunks with 5% blockage as a maximum since these trunks might have a higher monthly cost than Central Office trunks.

Also, since the TIE trunks handle calls only from your own private network users, you can train them to use the Ring Again feature to queue for the trunks when these are busy, or they can try the call at a later time after the blockage has cleared.

The higher the acceptable blockage, the fewer trunks you need for the given amount of traffic.

You must assess what impact an *all trunks busy* condition might have on the type of caller who uses the trunks, and the resulting impact on your business before choosing the grade of service.

Provisioning tables

You and your system supplier must discuss the kind of provisioning tables to use: Three of the most common ones are called:

- ◆ Poisson
- ◆ Erlang B
- ◆ Erlang C

Traffic

Poisson and Erlang B statistical tables provision almost the same number of trunks when there are low levels of traffic on a trunk group. However, as the traffic levels increase, the Poisson tables provision more trunks than the Erlang B tables.

If you want to provision a buffer for periods of peak traffic or if the trunk group you are provisioning is a last choice trunk group on a system which uses automatic route selection, use the Poisson table.

If you are provisioning one of the first choice trunk groups, the Erlang B tables provision exactly enough trunks for the grade of service you requested with no buffer for peaks. You can expect that overflowed calls during short-term peaks in traffic will go to the last choice trunk group if the first choices are busy.

Use Erlang C tables only if you expect your users to queue during busy times when all trunks in that group are busy. *Do not provision using these tables if your users will not queue or if your business cannot tolerate queuing.* These tables provision low numbers of trunks since these tables assume that queuing will occur.

Other information

Other fields of data in this study show you the following additional information:

- ◆ the number of trunks equipped and the number of trunks working

This data is one way to monitor each trunk group to ensure there are no disabled trunks. If there are any, be sure to enable them and run a new study before you assess the traffic data.

Your system maintainer is probably running maintenance diagnostics on your trunks periodically in order to maintain your trunks in good working order.

There are also maintenance messages which print out on maintenance printers when there are trunk problems.

Your attendant can also check each trunk in each trunk group on a regular basis from the console. Instructions on how to do that are in the Console User Guide.

- ◆ how many times during the study period there were no available trunks in that trunk group and a call intended for that group of trunks was blocked or sent to a second trunk choice, if one exists. These are referred to as overflowed calls.

Overflows are not necessarily bad, especially if the overflowed calls do go out on a second choice trunk group and the cost for these overflowed calls is lower than the cost of installing additional trunks in the trunk group which overflowed them.

- ◆ how many times during the study period the last available trunk in that trunk group was used by a call

A high number is not necessarily bad unless it is accompanied by a high number of overflows as well. Then the same argument stated in the previous item applies.

There is a row (or optionally two rows) of keys on the attendant console for Trunk Group Busy indicators. Your attendant can monitor trunk groups by noticing how often these key lamps flash. A flashing lamp means all the trunks in that group are busy.

TEC002

Traffic

You might want to tell the attendant to inform you whenever certain trunk groups seem to be busy frequently, and to tell you the times of day when that is happening.

- ◆ the number of calls which were dialed with a 0 or 1 following the trunk group access code

This pegs only for Central Office and foreign exchange trunk groups. If users are supposed to be restricted, you might use this as a quick way of checking if the necessary restrictions are in place. Check your Call Detail Records for more detailed information on what calls are being made and what telephones are being used to make them.

- ◆ the last two fields of data apply to ISDN trunks. A discussion of this is beyond the scope of this book. If you are using ISDN, discuss your study results with your system supplier.

Threshold

There is an All Trunks Busy threshold which you can program to automatically monitor the trunk groups on your system. The threshold

When the TPO option is activated in the Configuration Record (LD 17), TFC002 trunk usage data in each printout will include all duration data even though some calls are still in progress. When calls are disconnected, the next scheduled printout after the disconnect shows the duration data of the calls for that reporting period and a peg count for the calls.

Trunk Seizure Option (TSO)

Normally, trunk usage data begins to accumulate for the TFC002 study option only after a call is considered to be established.

A call is considered to be established when:

- ◆ the End-of-Dialing timer expires after the last digit is dialed
- ◆ octothorpe (#) is dialed
- ◆ answer supervision is received from the other end

The TSO option allows the data to be accumulated beginning with trunk seizure, and not only after the call is established. You can have this option activated in the Configuration Record (LD 17).

Some calls that users make are not answered. Data will still accumulate if this option has been activated on your system. However, if the time between trunk seizure and call disconnect is too small (less than 4 seconds), the usage and peg count will not be accumulated.

TFC002

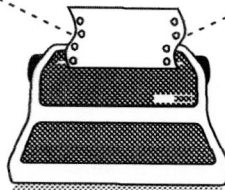
Traffic

TFC003 – Attendant queue

Sample data

System ID	TFC003
Customer number	
Average speed of answer	Average attendant response
Calls delayed peg count	Average time in queue
Abandoned calls peg count	Average wait time of abandoned calls
200	TFC003
003	
00107	00048
00289	00079
00015	00192

The headings shown in this example
do not appear in the printout.



533-0300T TTY

This study prints out the usage data in units of seconds.

Purposes of TFC003 study

Each customer group has one attendant queue, if there are attendant consoles programmed. All consoles for one customer group receive calls from the same queue. The traffic study option, TFC003, *Attendant queues*, monitors the entire queue, not each individual console. Traffic study option TFC004, *Attendant consoles*, monitors each console. Usually a traffic study analyst looks at these two console-related studies together to get a complete look at the console statistics.



Never make recommendations about the attendants before you:

- ◆ *sit with them for extended periods of time. You need to understand their daily routine, busy hour routine and the reasons for their behavior before you can make sense out of the data in these two studies.*
- ◆ *familiarize yourself with proper console operation by referring to a User Guide*
- ◆ *discuss efficient call answering techniques with your system supplier*

It is important to note that systems using Direct-in-Dial (DID) trunks do not have as many calls coming into the console as systems of similar size without DID trunks. The calls which do go to the console are usually more time-consuming. The caller probably needs information since they did not use a DID number to make the call. You should bear this in mind when you analyze your data.

TFC003

Traffic

Average speed of answer

This study monitors calls intended for the attendant and measures how long they spend waiting to be answered.

Some calls are immediately presented to an available attendant while others wait in queue before being answered. All calls for the attendant are averaged together for each hour. The calls could be external or Dial 0, or recalls of unanswered calls which were previously extended to telephones by the attendant.

Look for an average of ten seconds if your attendants are not overloaded.

Average Attendant Response

This is the average time elapsed between the time a call is presented to an available console and the time the attendant answers it.

The attendant has two ways of answering the call. Either by pressing the Incoming Call Indicator key or the Loop key. It doesn't matter which way the attendant answers. The averages are not affected.

Two seconds is considered the maximum acceptable time, if the attendant is not expected to perform other duties along with answering calls on the console.

Peg count of calls delayed

The system counts all calls which spend time in the attendant queue before being answered by the attendant, except the calls which abandon.

Abandoned calls are those where the caller hangs up while in the attendant queue or after being presented to the attendant. Abandoned calls are counted in a separate field of data.

Calculate a percentage of calls delayed. Divide the peg count of delayed calls by the total number of calls processed (add internal and external call peg counts). Multiply by 100 to arrive at the percentage. If the percentage is higher than 25–35% you might have an overloaded attendant.

Average time in queue

This is the time that calls spend in the attendant queue averaged over all calls that spend time in the queue. Some typical delay times are listed here.

Table 18
Call delay times related to the number of consoles

Number of consoles	Typical delay time (seconds)
1	12
2	10
3	8
4	6
5	4

Peg count of abandoned calls

This is a count of internally-originated and externally-originated calls which abandon before being answered by the attendant.

Calculate a percentage of calls abandoned. Divide the peg count of abandoned calls by the total number of calls processed (add internal and external call peg counts). Multiply by 100 to arrive at the percentage. If the percentage is higher than 1–2% you might have an overloaded attendant or you might have overloaded loops. You might also have very impatient callers! (The more you get to know the expectations of your callers, the better service you can provide).

Average wait time of abandoned calls

The average time that a call waited before abandoning.

TEC003

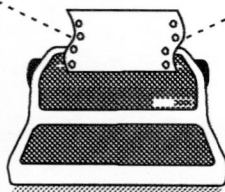
Traffic

TFC004 – Attendant consoles

Sample data

System ID	TFC004
Customer number	
Attendant number	
Peg count of internal calls processed by attendant	Total time spent processing internal call requests
Peg count of external calls processed by attendant	Total time spent processing external call requests
Total time console is attended	Total time spent processing calls
Peg count of the number of times all Loop Keys were busy	
Peg count of Attendant Alternative Answering call attempts	Peg count of answered Attendant Alternative Answering calls
200	TFC004
000	
001	
00076	0000011
00167	0000017
000036	0000029
00000	
00005	0000003

The headings shown in this example do not appear in the printout.



This study prints out the usage data in units of CCS.

Purposes of TFC004 study

Study option TFC004 monitors each individual console. It monitors all calls being handled by each attendant, so an external call which is extended to a telephone by an attendant gathers external call statistics. If the call recalls to the attendant queue because it is not answered, it gathers new external call statistics at this point.

Peg count of internal calls processed by the attendant

When an attendant removes a call from the console, the peg count increments. Internal calls are those originated by users on the system, attendants, and even calls made on the paging system.

Total time spent processing internal call requests

A call that is pegged as internal, is timed in units of CCS. If such a call is put on hold, the timer stops and is started again once the call is removed from hold.

You can calculate an average *work time* per internal call. This gives you an idea of how efficient each attendant is. Do not jump to conclusions. Attendants who spend longer with callers than other attendants may be providing very good service to your callers.

Divide the Total time spent processing internal calls by the peg count of the number of internal calls. Multiply this number by 100 to change the units to seconds per call.

Peg count of external calls processed by the attendant

This is a count of all external incoming calls answered by the attendant. This includes calls coming in from DID trunks which were routed to busy telephones and were sent to the console by the Call Forward Busy feature. Recalls from camped-on calls and ring-no-answer calls are also pegged as external calls.

Total time spent processing external call requests

A call that is pegged as external, is timed in units of CCS. If such a call is put on hold, the timer stops and is started again once the call is removed from hold.

TFC004

Traffic

You can calculate an average work time per external call.

Divide the Total time spent processing external calls by the peg count of the number of external calls. Multiply this number by 100 to change the units to seconds per call.

If you calculated the average work time for internal calls, compare this external call average work time to that number. If you find the internal and external work times differ significantly, sit with the attendants to find out why. The longer an attendant speaks to an internal caller, the longer an external caller must wait.

Total time console is attended

This field of data shows the total amount of time during the study period, usually one hour, that the console was not in Night Service mode nor Position Busy mode.

When the console is put into Night Service or Position Busy, calls in progress, or calls made by the attendant, continue to accumulate time. It is possible, therefore, to have a Total Time Spent Processing Calls measurement which is greater than the measurement of Time the Console is Attended.

You can use this data to monitor the break-times which the attendants are taking. A 15 minute break equates to 9 CCS. A full hour is 36 CCS.

Total time spent processing calls

The system combines the time spent answering internal and external calls. This way the number is rounded to the nearest CCS only once, whereas if you manually add the internal and external times, this includes two roundings. The number the system calculates is the more accurate.

For example, if the actual time spent answering internal calls was 13.3 CCS, the study prints 13 CCS.

If the actual time spent answering external calls was 14.4 CCS, the study prints 14 CCS.

If you add the numbers yourself, you get 27 CCS.

The system calculates 27.7 CCS and rounds it to 28 which is actually closer to the real number than 27 CCS is.

You can calculate an average work time per call (internal + external calls).

Divide the Total time spent processing calls by the peg count of the number of internal + external calls. Multiply this number by 100 to change the units to seconds per call.

A good average work time is 10–12 seconds per call. A good average number of calls per hour is 150–170. As the number of calls approaches 200, the attendant might be sacrificing good service for faster speed. Attendants tend to feel stress beyond 170 calls per hour. Do not overload them. Consider these options:

- ◆ hire more attendants
- ◆ install DID trunks to take some of the load from the attendants
- ◆ install Meridian Mail Automated Attendant Service as a front end to process calls for callers who know the DN they want, or to give information to callers and take the load from the attendants

If calls are waiting in queue for longer than average times, consider installing a recorded announcement device or setting up Meridian Mail voice mail to take some of the load.

Peg count of the number of times all Loop keys were busy

There are six Loop keys on each console for answering and making calls. Anytime the last Loop key on the console is used, this peg count increments.

Attendants use more than one Loop key at a time if they put one call on hold and answer another call using a second Loop key. If they do this repeatedly, they can tie up all six Loop keys and therefore cannot answer any more calls.

TEC004

Traffic

If the data indicates that attendants are tying up Loop keys, sit with them to understand why this is happening, before you make an assessment.

Peg count of Attendant Alternative Answering calls

As of Release 15, if a call is presented to a console and the attendant does not answer, the call can be sent to a designated Directory Number (DN) which can appear on one or more telephones. This feature is called Attendant Alternative Answering. Each console can have a different DN designated for this.

This data is a count of the number of times calls were not answered and were routed to the designated DN.

You need to find out why this is occurring if you see peg counts here. As the numbers rise, the load on the user of the designated DN increases.

You might need to remind the attendants to use the Position Busy feature when they leave the consoles so calls do not get presented to unattended consoles. You can set it up so that more than one person can answer the re-routed calls if the load is high.

Threshold

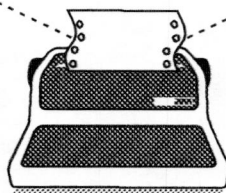
You can have the system print a warning message whenever the Average Speed of Answer for your attendants exceeds the value you set.

Along with the threshold violation message, data from traffic study options TFC003 and TFC004 prints as well. This helps you analyze the overall attendant situation.

TFC005 – Features**Sample data**

System ID	TFC005
Customer number	
Feature number	Peg count
200	TFC005
000	
000	00012
001	00002
002	00003
003	00015

The headings shown in this example
do not appear in the printout.



533-0300T TTY

TFC005

Traffic

Purposes of TFC005 study

The data in traffic study option TFC005 shows you how often features are used during a study period in the customer group specified.



The features must be activated from a key which means only digital telephones, SL-1-type telephones and attendant consoles are monitored.

Features by number

There is a peg count associated with each feature. Each feature is listed by number.

Table 19
Feature numbers and names

Feature number	Feature name
000	Auto Dial
001	Call Forward All Calls
002	Call Pickup
003	Call Transfer
004	Call Waiting
005	3-Party Conference
006	6-Party Conference
007	Manual Signaling
008	Override
009	Privacy Release
010	Private Line Service
011	Ring Again
012	Speed Call
013	Voice Call
014	Volume control
015	Busy Verify
016	Barge-in
— continued —	

TFC005



Table 19
Feature numbers and names (Continued)

Feature number	Feature name
017	Call Selection
018	Attendant Recall
019	Dial Intercom
020	Message Waiting Indicator
021	Message Indication
022	Message Cancellation
023	Message Center INCALLS
024	Attendant Overflow
025	Group Call
026	Auto Answerback
027	reserved for future use
028	reserved for future use
029	Call Park
030	Stored Number Redial
031	Last Number Redial
032	Malicious Call Trace
033	Enhanced Hot Line
034	Group Pickup
035	DN Pickup
036	Attendant End-to-End Signaling
037	Internal Call Forward
038	EES Digit Count
039-045	reserved for future use

TEC005

Traffic

The count increments when features are used, but not when they are reprogrammed from the telephone. For example, when the Call Forward All Calls DN is changed by the user at the telephone, the count for the Call Forward All Calls feature does not increment. It increments when the user activates the Call Forward All Calls feature and redirects calls for the telephone to another DN.

Every time an additional party is added on to a conference, the counter for the Conference feature increments.

What can you learn from the data?

What usually emerges from this study is data to support your suspicions that users need more training in the use of features.

This data will support you when you want to justify the need for ongoing formal or informal training sessions.

You know what features your system was designed around. You know what features the users are expected to use and why. You also know your organization. Use this information to evaluate the data in the study for your needs.

- ◆ excessively high usage of features can be as alarming as low usage. For example, high usage of the Call Forward All Calls feature (# 001) might mean people are not making themselves available for calls.

Walking around can help you find out how people use the telephone during the average work day.

- ◆ low usage of features like Call Pickup (# 002) might mean calls are not being answered. This may lead to more training, or redesigning the system with different kinds of telephones to accommodate more shared DNs so that calls are answered. It would be unfortunate if you added additional attendants to handle large numbers of recalls when there are other ways to improve the situation.

- ◆ high usage of Ring Again (# 011) during the busy hours usually means you do not have sufficient trunks for the traffic load your users put on them. It can also mean there are disabled trunks, especially if there is high usage of the feature during slow or average hours.
- ◆ low usage of the Speed Call feature (# 012) might mean people need training on the use and programming of the Speed Call lists. If users continue with low usage of the feature you might consider removing the empty lists in order to save memory. Ask your system supplier to help you print out the lists on your system periodically to see which lists are empty or improperly programmed.
- ◆ no usage of the Barge-in feature (# 016) indicates the attendants are not taking advantage of the ability to test trunks from the console. This is a maintenance routine which can be useful in early detection of disabled trunks.

Other Customer traffic study options

TFC006, TFC007, TFC008, TFC009 are the remaining Customer traffic study options. The content of these studies relates to optional system components and some of them also require optional software packages. They are beyond the scope of this book. See the *Traffic measurement formats and output* for more information.

Traffic

Setting up the study

Procedures



- ◆ Check your maintenance agreement with your system supplier before you attempt to set up a traffic study.
- ◆ If your system supplier agrees that you may run studies, they can train you to schedule the studies properly and choose the appropriate study options.
- ◆ You will use overlay program 2 to set up traffic studies.

Refer to the *Traffic measurement formats and output* for more information on overlay program 2.

- ◆ *Print the existing traffic study schedules and the options which are already selected before you make changes. If you do not do this, you might accidentally change a schedule that someone else has set up. This can affect a study already in progress or one planned for the near future.*

Tell other people who set up studies to print any existing traffic study schedules before they set a new schedule.

- ◆ *Notify other people who are involved with your system when you are running a study. The technician needs to know, for example, so that when study data prints out it will not be discarded accidentally.*
- ◆ Print the schedules and options after you have finished inputting to verify that you entered the settings correctly.
- ◆ Check the printer during the first scheduled output time to be sure data prints out with no problems.
- ◆ Check your printer often during the study to ensure that you are getting all the data you should be getting and that the printer is in good working order.

Printout formats

The beginning of a study is labelled with the header message **TFS000** followed by the date and time of the printout.



The end of the study is labelled with a footer message **TFS999**.

Be careful to tear off the printer paper so you can see both the header message and the footer message. If you don't, you will not see the *important warning messages and threshold violations which print at the beginning of the study* or you will miss parts of the last study option printout.

Some of these warnings might be telling you to ignore the data for various reasons. For example, if the system initializes, the traffic registers are cleared out. If this occurs at some point during the study period, there is no point in using the data since it is not complete.

Invoking data

If you check the printer and you find that a problem of some kind prevented the data from printing out, you can still retrieve the data.

However, you can only retrieve the data from the most recent scheduled study period. Retrieving this data is called *invoking* the data.

The data from the most recent study period is held in memory while the data from the next study period is being collected. When the system is scheduled to print the new data, the old data is removed from memory and replaced with the new data. If you do not invoke and print the old data quickly enough, it is replaced with new data and no longer available to you.



You must retrieve old data before the next printout is scheduled or it will be erased.

Be sure your system supplier trains you on this procedure. You can read about the commands for this in the *Traffic measurement formats and output*.

Traffic

Control tips



- ◆ If you tell users you are running a traffic study, they might alter their habits when using the telephone. This is especially true of attendants who may think you are doing an analysis of them for job performance purposes. If you want to capture the normal activity levels, do not tell users about the study.
- ◆ Tell the system maintainer that you are running a study so they can avoid doing work and maintenance routines which have an impact on the data. For example, doing a manual initialization clears out the traffic data in memory; avoid doing this while a study is running.
- ◆ If cards are moved to different loops or new cards are installed ask the system maintainer to let you know the date and time of this work, so you can include that information in your analysis.
- ◆ Ask the system maintainer to keep track of warning messages which might print out concerning, for example, the loops, Superloops, timeslots, and trunks. If there are problems which the system identifies, these warnings should be included in the traffic analysis too.

Administration tips



- ◆ If the TTY device which your system maintainer uses to program and maintain your system is also configured to receive traffic study data, at times, your system maintainer might find this annoying.

When the traffic study data is printing, it interrupts the programmer until all the data from the study has printed out. Once it has printed, the programmer can resume where he or she left off, but it may take some time for the data to print.

Try to configure a separate printer for Traffic studies if you can.

- ◆ One thing to note is the speed at which the study prints out. If the traffic study data prints and then stops and then prints again, and this continues, it is one indication that your system CPU is working hard at that time.

Traffic study printing is a low priority task for the CPU and if there are many other tasks to do, the study printouts slow down. If you are running TFS004, pay attention to the CPU real-time analysis, to see if your CPU is overloaded.

Training tips



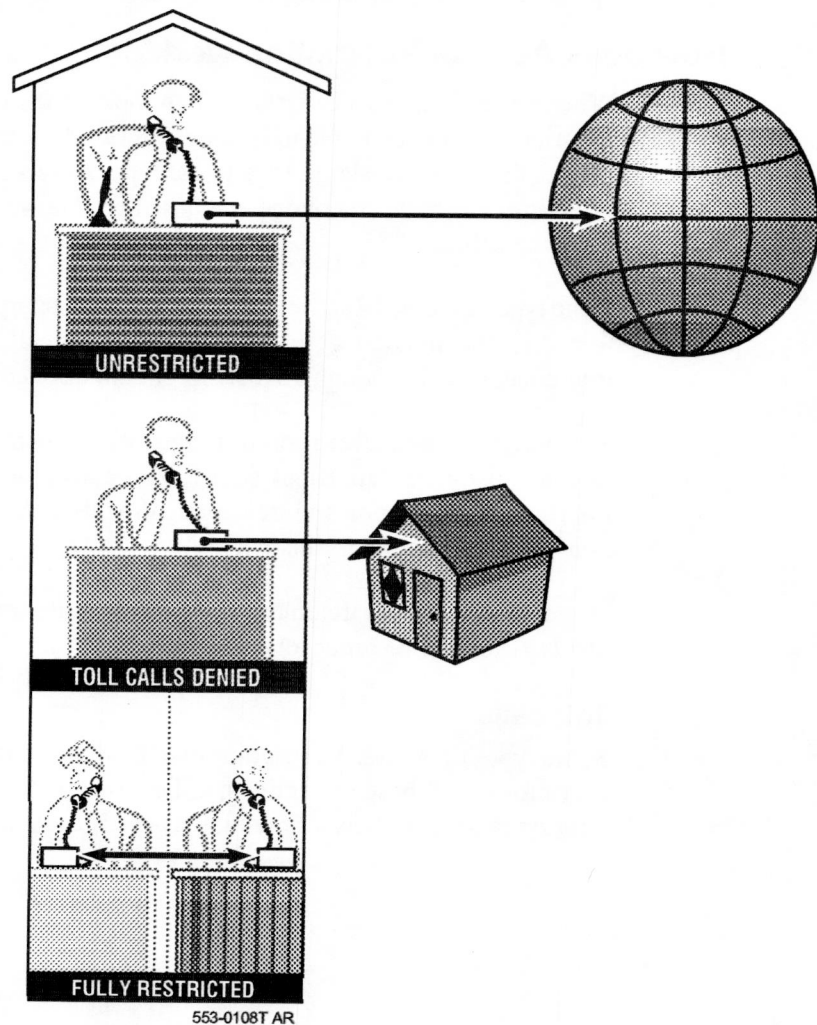
- ◆ The data from study option TFC005 can have a major impact on your training programs. Once you see the patterns of feature use and non-use, you can use the data to focus your training effectively.
- ◆ The data in study options TFC003 and TFC004 can have a major effect on the training you do with the attendants. Use the data in conjunction with your observations about their performance and the goals of your organization for efficient call answering.

Traffic

Access Restriction

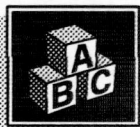
Purpose

You can use the Access Restrictions feature to limit terminal access to the exchange network, and private trunk network, and to control access to certain services and features.



Access Restriction

Basic feature configuration



This part tells you:

- ◆ how the feature has to be set up to make basic feature operation possible
- ◆ what you need to know to manage interactions with other features

The Access Restriction capability comes with the communication system. You select the telephones that you want to restrict, then you use the procedure in this module to program each one.

How does Access Restriction work?

When a user initiates a call, the system looks at the type of Access Restriction assigned to the telephone before a digit is dialed. As each digit is dialed, the system refers to the type of Access Restriction programmed for the telephone and based on that will either allow or deny the call.

If the type of Access Restriction assigned to the telephone is designed to restrict the digits that the user has dialed, the call is blocked immediately, even though the user might not have completed dialing.

The user hears whatever form of Intercept treatment is programmed in your Customer Data Block (LD 15) for calls blocked in this way. For further information on Intercept treatments, refer to the *Terms and abbreviations* section of this book.

The default Intercept treatment is Overflow tone, sometimes called *fast busy* tone or *re-order* tone.

Toll calls

Some types of Access Restriction specifically restrict *toll calls*. For the purposes of these restrictions, toll calls are defined as calls where the first or second digit following the access code is the digit 1 or 0.

Access Restriction

Call modification

Some of the types of Access Restrictions are involved with what is called *call modification*. Call modification occurs when such features as Call Park, Call Pickup, Call Transfer or Conference or Night Service are used in call answering.

For example, if one user calls another user and asks that user to transfer the call out to a trunk, the call is *modified* by the Call Transfer feature.

Class of Service

You can enable and disable many features and services in the Class of Service programming of a telephone. Access Restriction is only one of many parts of the Class of Service.

The following types of terminals have a Class of Service; and therefore, you can assign Access Restrictions to them:

- ◆ dial or Digitone-type telephones
- ◆ digital or SL-1-type telephones
- ◆ Meridian Mail channels
- ◆ TIE trunks
- ◆ Authorization codes
- ◆ Direct Inward System Access (DISA) ports

Before programming you need to understand the requirements of the user or users of the terminal. Restriction requirements differ depending on whether the terminal is a telephone, or a trunk or an authorization code.

To get the appropriate information about a user's needs when making business calls, you might need to talk to the user's manager.

Access Restriction

Types of Access Restrictions

There are eight types of Access Restrictions:

Table 241

Access Restriction names and mnemonics

Restriction name	Mnemonic
Unrestricted	UNR
Conditionally Toll Denied	CTD
Conditionally Unrestricted	CUN
Toll Denied	TLD
Semi-Restricted	SRE
Fully Restricted	FRE
Fully Restricted Type 1	FR1
Fully Restricted Type 2	FR2

The following explanations tell you what each type of restriction allows a user to do.

Unrestricted Service (UNR)

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed to make and receive calls to and from any trunk group.
- ◆ Allowed toll calls on any trunk group.

Conditionally Unrestricted Service (CUN)

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed access to external calls by using ANI (Automatic Number Identification) trunk groups only.

Access Restriction

Conditionally Toll Denied (CTD)

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed to receive calls from external trunk groups.
- ◆ Allowed toll calls on WATS trunks, unless New Flexible Code Restriction (NFCR) denies certain digits. For more information on NFCR, refer to *X11 features and services*.
- ◆ Denied toll calls on COT/FEX type trunk groups, unless NFCR allows specific digits.
- ◆ Allowed Special numbers like 411, 611, and 911, unless denied by NFCR.
- ◆ Allowed toll calls on COT/FEX/WATS trunk groups when Basic Automatic Route Selection (BARS) or Network Alternate Route Selection (NARS) or Coordinated Dialing Plan (CDP) access codes are used.

NFCR is ignored for CTD terminals when BARS or NARS or CDP codes are used for the call.

- ◆ Allowed all calls on TIE trunk groups, unless NFCR denies certain digits and the user dialed a direct trunk access code.

Access Restriction

Toll Denied (TLD)

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed to receive calls from the exchange network.
- ◆ Allowed toll calls on WATS trunk groups using direct trunk access codes or BARS or NARS access codes, unless NFCR denies certain digits.
- ◆ Denied toll calls on COT/FEX trunk groups if the user dials direct trunk access codes, unless NFCR allows the digits.
- ◆ Denied toll calls on COT/FEX trunk groups if the user dials BARS or NARS access codes, unless NFCR allows the digits.
- ◆ Allowed Special numbers like 411, 611, and 911, unless NFCR denies these digits.
- ◆ Allowed access to toll calls with assistance from an attendant or an unrestricted telephone user. The attendant or unrestricted telephone user must connect the TLD user to a trunk using the Conference or Call Transfer features.
- ◆ Allowed toll calls and special number calls on TIE trunk groups, unless NFCR denies certain digits. This applies if the user dials direct trunk access codes or BARS or NARS access codes.

Semi-Restricted (SRE)

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed to receive calls from external trunk groups.
- ◆ Denied from outgoing access to external trunk groups, except when assisted by an attendant or an unrestricted telephone user who is using Call Transfer or Conference to connect the SRE telephone to a trunk.

Access Restriction

Fully Restricted Service (FRE, FR1, FR2)

FRE

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed access to TIE and CCSA (Common Controlled Switching Arrangement) trunk groups.
- ◆ Allowed access to and from external trunk groups with call modification by an unrestricted telephone user.

There is an FRPT prompt in the Configuration record (LD 17) that controls access to incoming calls for FRE telephones. Access to incoming calls is denied by default, but you can change the programming to allow it.

- ◆ Denied access to and from external trunk groups either by direct access, or using the assistance of an attendant.

FR1

- ◆ Allowed to make and receive internal calls.
- ◆ Allowed access to TIE and CCSA trunk groups.
- ◆ Denied access to and from external trunk groups, either by direct access, or using the assistance of an attendant or with call modification from an unrestricted telephone user.

FR2

- ◆ Allowed to make and receive internal calls.
- ◆ Denied access to TIE and CCSA trunk groups.
- ◆ Denied access to and from external trunk groups either by direct access, or using the assistance of an attendant or call modification from an unrestricted telephone user.

Access Restriction

Default settings



With software prior to Release 22, the default Access Restriction setting in the Class of Service of telephones and trunks is UNR, Unrestricted.

With Release 22 and later, the default setting is CTD, Conditionally Toll Denied.

This means that terminals are unrestricted unless you program an access restriction in the Class of Service on systems using software prior to Release 22. Refer to the *Tips* later in this section for the impact this default setting can have.

With Release 22 and later software, by default, terminals are not allowed to make toll calls by accessing trunk groups directly (using access codes). This gives you control of terminals by default. The control is only released if you change the Class of Service to UNR.

Note: If Basic Automatic Route Selection (BARS) or Network Alternate Route Selection (NARS) software is programmed then you can assign Network Class of Service (NCOS) values to the terminals. It is the Class of Service and the NCOS that determine what calls are allowed from that terminal. When you assign the CTD Class of Service to terminals, the users are forced to dial toll calls using the BARS or NARS access codes. In this way, you have the control you need in order to benefit from the automatic route selection software in the best way possible.

Access Restriction

Using the feature

Table 242
Access Restrictions types and possible applications

Type	Possible application
UNR	Executive telephones
CTD	Telephones on a system with BARS or NARS
CUN	Telephones on a system with ANI trunks
TLD	Telephones with no long distance privileges
SRE	Telephone of a user who is supposed to make calls only when assisted by the attendant or a manager
FRE	Telephone of a user who can make calls to other company locations on the private network but needs assistance from a manager when placing calls on the exchange network
FR1	Telephone of a user who only needs to make calls to other company locations on the private network
FR2	Telephone at a secured entrance to a building

There are many other possible applications of each Access Restriction type. Those shown in the chart above are examples only.

Interactions with other features

Access Restrictions work with, affect, or are affected by, several other features that are basic to the system. You need to be aware of, and understand, these interactions before programming. The rest of this sub-section tells you what you need. For further information, you can use *X11 features and services*.

Features that change the Access Restriction type

The following features change the Access Restriction assigned to a terminal on a per call or permanent basis.

Access Restriction

They are:

- ◆ Forced Charge Account
- ◆ Authorization Code
- ◆ System Speed Call
- ◆ Scheduled Access Restriction
- ◆ Controlled Class of Service
- ◆ Electronic Lock

Refer to *XII features and services* for further information on the operation of these features. Each one is designed to change the operating Access Restriction type assigned to allow certain types of calls to be made under certain controlled conditions.

Forced Charge Account and Authorization Code features permit a user to change the restriction assigned to the telephone or trunk. When the user enters a code, it prints out on a printer. This can be used for billing purposes.

- ◆ The Forced Charge Account code is usually associated with a person for whom or about whom the call is being made. For example, a lawyer would associate a Forced Charge Account Code with each client for whom calls are made.
- ◆ An Authorization Code is associated with a user. This allows a user to move around and use other telephones or call in on a trunk and still be billed for the calls they made.

System Speed Call allows you, or someone on your site, to program certain approved telephone numbers on a System Speed Call list. Users can be programmed to have access to the list. When they use the System Speed Call feature to make calls, they temporarily become UNR and long distance numbers stored on the list get processed, even if the telephone is programmed as TLD. However, if they try to dial long distance calls without using the System Speed Call feature, these calls are not allowed.

Access Restriction

Scheduled Access Restriction Groups allow Access Restriction types for groups of users to change at certain times or on certain days. This feature is often used to control unauthorized calls outside normal working hours. At a certain time each day, the Access Restrictions change to restrict calls.

Controlled Class of Service allows one user to change the Access Restriction assigned to another telephone. It is often used by secretaries to restrict office telephones when the offices are not being used and then unrestrict them when they are being used. Empty conference room telephones can be controlled in this way.

Electronic Lock allows users to change the Access Restriction assigned to their own telephones, for example, when they leave at the end of the day. Before they leave, they dial the codes which restrict the telephones to prevent unauthorized people from making costly calls at night. In the morning, they dial the codes which unrestrict their telephones.

You can mention these interactions to users in training sessions if they are going to use these features. If the telephones are programmed with a very restrictive type of Access Restriction and you intend that approved users override the restrictions with a feature, then you must let users know how they can make approved calls. Users sometimes report these interactions as problems if they lack understanding. Proper training can reduce the number of repair calls of this nature.

Access Restriction

Improving feature performance



The parts that follow make you aware of issues that could affect implementation. You should resolve these issues before you begin programming. Use the checklist under *What to have ready* to confirm that you have what you need.

Meridian Mail

The Meridian Mail voice mail system is connected to the Meridian 1 system with channels that are programmed as SL-1-type TNs (without associated telephones) in the Meridian 1. You can program an Access Restriction in the Class of Service.

This impacts the type of calls that a caller can make using the Thru-Dial feature of Meridian Mail where callers can decide not to leave a message in a mailbox in the Meridian Mail, but dial out from the mailbox instead and onto the Meridian 1 trunks.

Access is allowed or denied depending on:

- ◆ the Meridian Mail restrictions, which can be programmed for the mailbox itself
- ◆ the Meridian 1 restrictions, such as the type of Access Restriction on the channel

Decide what calls you want to allow, if any, using the Thru-Dial feature. Decide whether you want the controls to be implemented in the programming of the mailbox or on the channel using the Meridian 1 Class of Service.

Set Based Administration Enhancements

If your system is equipped with this capability and you know the proper Flexible Feature Code and password, you can go to a telephone programmed for Administrator Access and change the Access Restriction assigned to any telephone in the customer group.

This method might be quicker and easier than using a TTY to make the change(s). It might be useful for controlling the Access Restriction levels of telephones at night or at certain times of the day when unauthorized calls might be made.

Access Restriction

You can control the use of this capability by limiting the number of people who know the Flexible Feature Code and password.

Control tips



- ◆ With software prior to Release 22, a terminal has unrestricted (UNR) access, by default. Check periodically for telephones on your system which have this UNR Class of Service in error. Check Call Detail Records frequently to monitor the types of calls that are going out of your system. Investigate what terminals are making the calls. Look for calls going out on your trunks originated by incoming TIE trunks, Meridian Mail channels, and DISA ports. In this way, you can be sure to program all the restrictions you need and ensure that the calls that are allowed are approved calls only.



- ◆ If a telephone is in an open area and all users can use it, consider implementing some form of Access Restriction to control the calls that can be made.
- ◆ DISA ports provide outside callers with access to your system. As a result, they can be risky to have on your system from a security point of view. If you have them, they must be assigned a type of Access Restriction which best suits the needs of the incoming callers who are approved to use the port. You must pay serious attention to controlling or blocking unauthorized calls. System administrators often assign a very restricted Access Restriction type to a DISA port to block unauthorized people. They give each approved caller an Authorization Code which overrides the restriction on the port for each call. Authorization Codes appear in Call Detail Records, if this is turned on, and calls are tracked and billed using this data.

Administration tips



- ◆ If you are assigning a Class of Service to a TIE trunk, you must investigate the access requirements of the users at the system at the other end of the TIE trunk. You must also decide what controls you want to place on the calls from the incoming TIE trunk as they access the outgoing trunks on your system.

Access Restriction

When you add a new TIE trunk to an existing group of TIE trunks with the Access Restriction programmed properly, use the same Access Restriction type for the new trunk. Not doing this causes one of the most common network-related repair situations, sporadic restriction-related problems for remote users.

- ◆ On systems where users will input Authorization Codes to make calls, you can program telephones with restriction types like TLD or an even more restricted level. The Access Restriction type for the call changes to the one assigned to the Authorization Code the user dialed. This is true even if the Authorization Code has a more restricted type than the one assigned to the telephone.
- ◆ You can use both Access Restriction and Trunk Group Access Restriction (TGAR) together in the programming of one telephone. These two features control access to toll calls as well as certain specific trunk groups. For example, you might want a user to be denied from all toll calls, therefore you program the Class of Service as TLD. Additionally, you might not want that user to call out on a specific FEX trunk group. Use the TGAR feature to block the user from that trunk group. For further information refer to Task 45, *Trunk Group Access Restriction*.
- ◆ Consider setting up policies about assigning certain Access Restrictions to certain types of users.

For example, management and senior level employees might be suitable for a UNR setting while other staff might have telephones set as TLD.

If you have BARS or NARS programmed on your site, it is a good idea to assign CTD to all telephones as the Access Restriction type. That way users will have to dial toll calls using BARS or NARS access codes and the NCOS will control what calls they can make.

When taking over administration of a system, it is important for you to understand the background behind your system design and existing system policies. Discuss the reasoning behind such things as restrictions with people who understand it.

Access Restriction

Training tips



- ◆ Avoid problems by doing proper training on an ongoing basis.
- ◆ Train users on what Overflow Tone sounds like and what it means. Train them to pay attention to the point in the call at which they heard the tone. This can be significant in trouble shooting.

If a user hears the tone before completing dialing, it usually means they are restricted. Let them know this in training. Let them know what restrictions they will experience. Let them know what to do if the restrictions they experience are different from what they expected, since there might be programming errors.

- ◆ Instead of Overflow Tone, you can implement Recorded Announcements (RANs) for Intercept treatments or have calls go to the attendant. This reduces the need for training since the users understand clearly why they are blocked when they hear an announcement or the attendant speaks to them.

Before doing this, investigate with your attendants whether they can handle the additional calls this will send to them. Tell them what to say to intercepted callers. Tell them your policies on assisting restricted users to make calls. Give them an Incoming Call Indicator key on the console that lights up as an additional reminder when the user is calling them from a restricted telephone.

Access Restriction

What to have ready

The following checklist summarizes the steps you should take before implementing the basic feature and/or the optional related features associated with the basic feature.

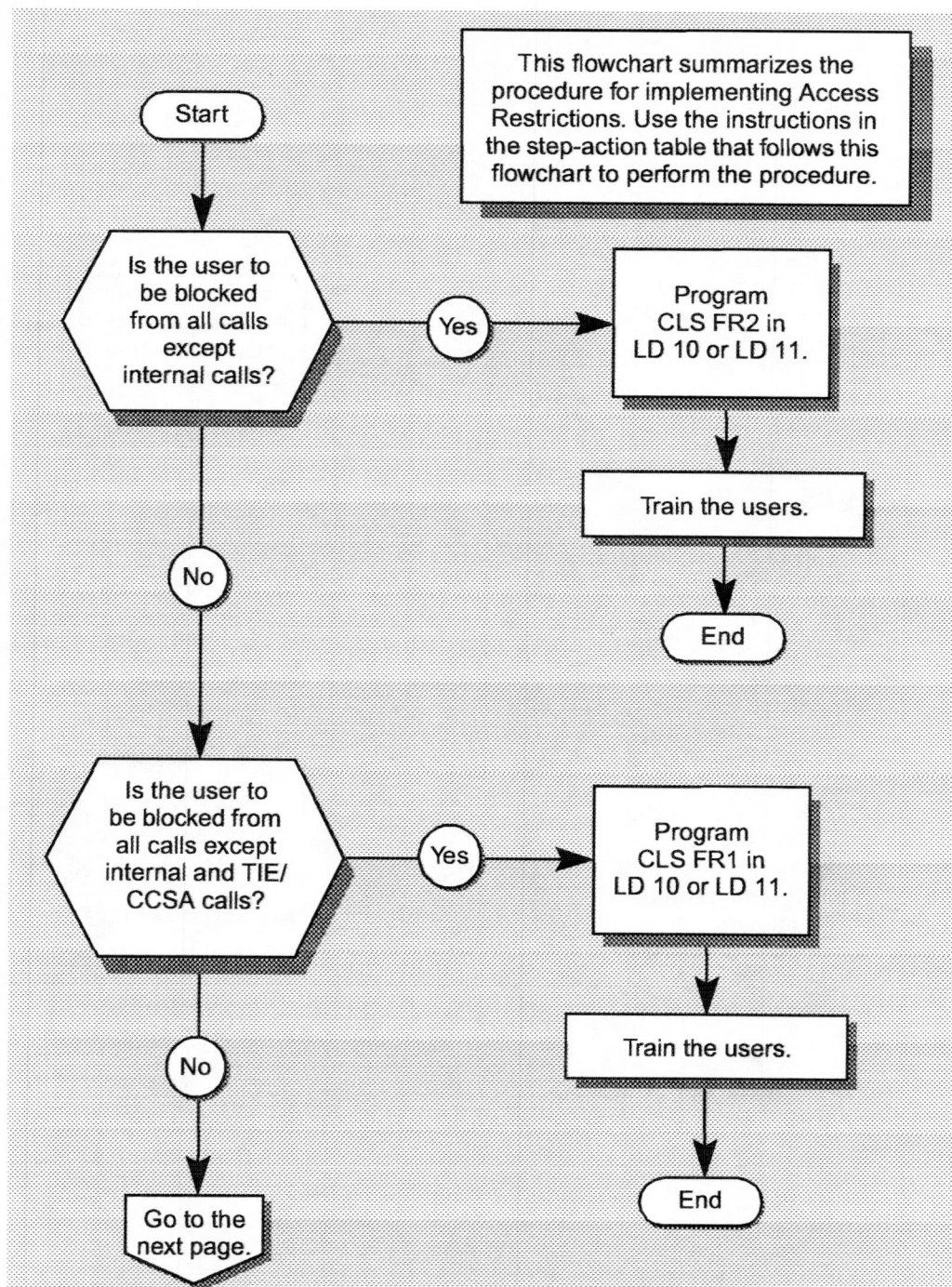
Table 243
Checklist

Basic	Optional	Preparation
✓		Determine the TN which is assigned to this telephone. If you do not assign TNs, ask your system supplier.
✓		Find out what Release of software you are using so you understand what the default type of Access Restriction is.
✓		Find out the user's calling needs by talking to the user or the user's manager.
✓		Find out if you have policies in place for assigning certain types of Access Restrictions to certain (or all) users.
	✓	Find out if there are features in place which will affect the Access Restriction of this telephone or telephone user. Assess the impact of these on what setting you will choose for this telephone.

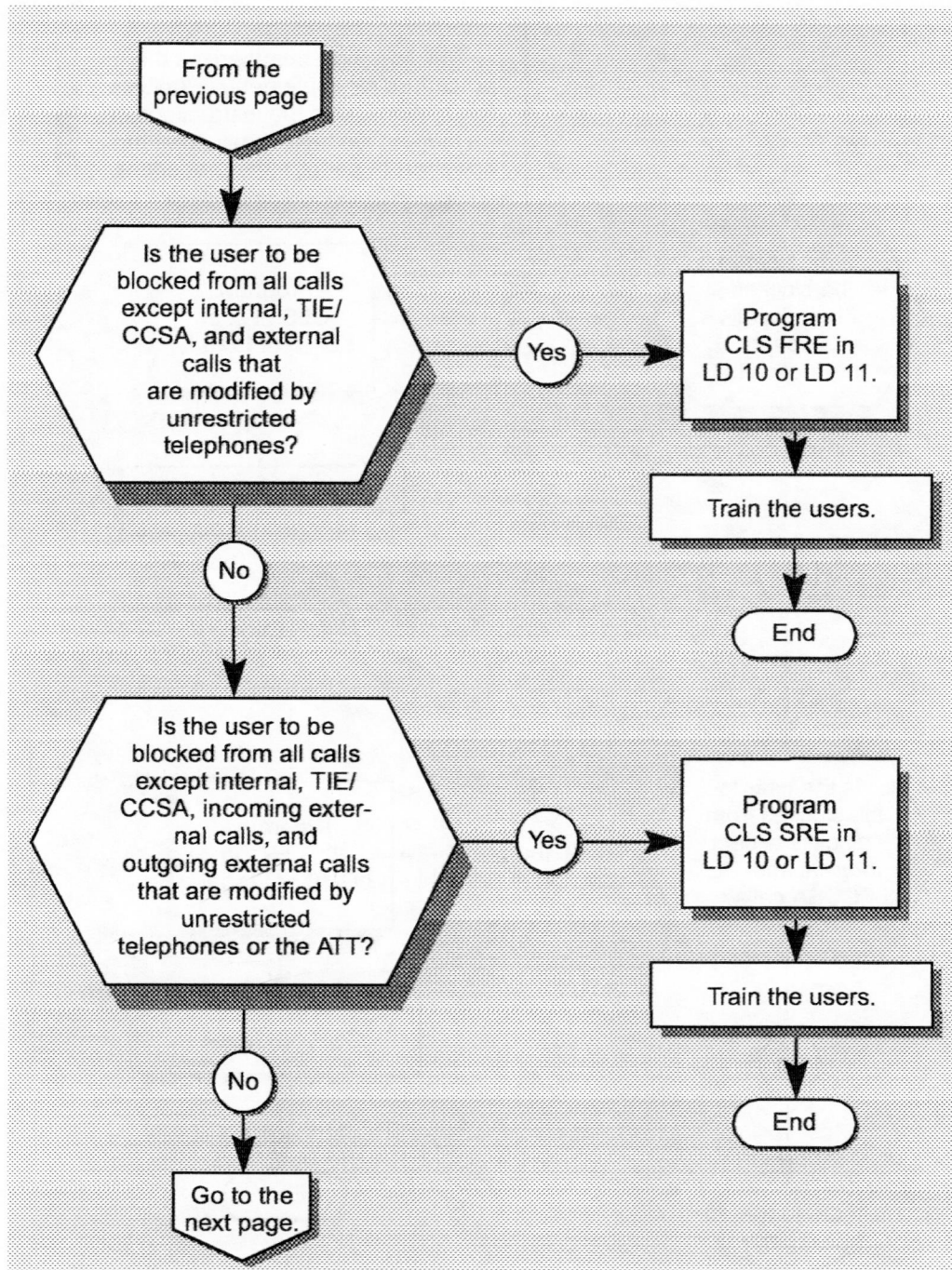
What's next?

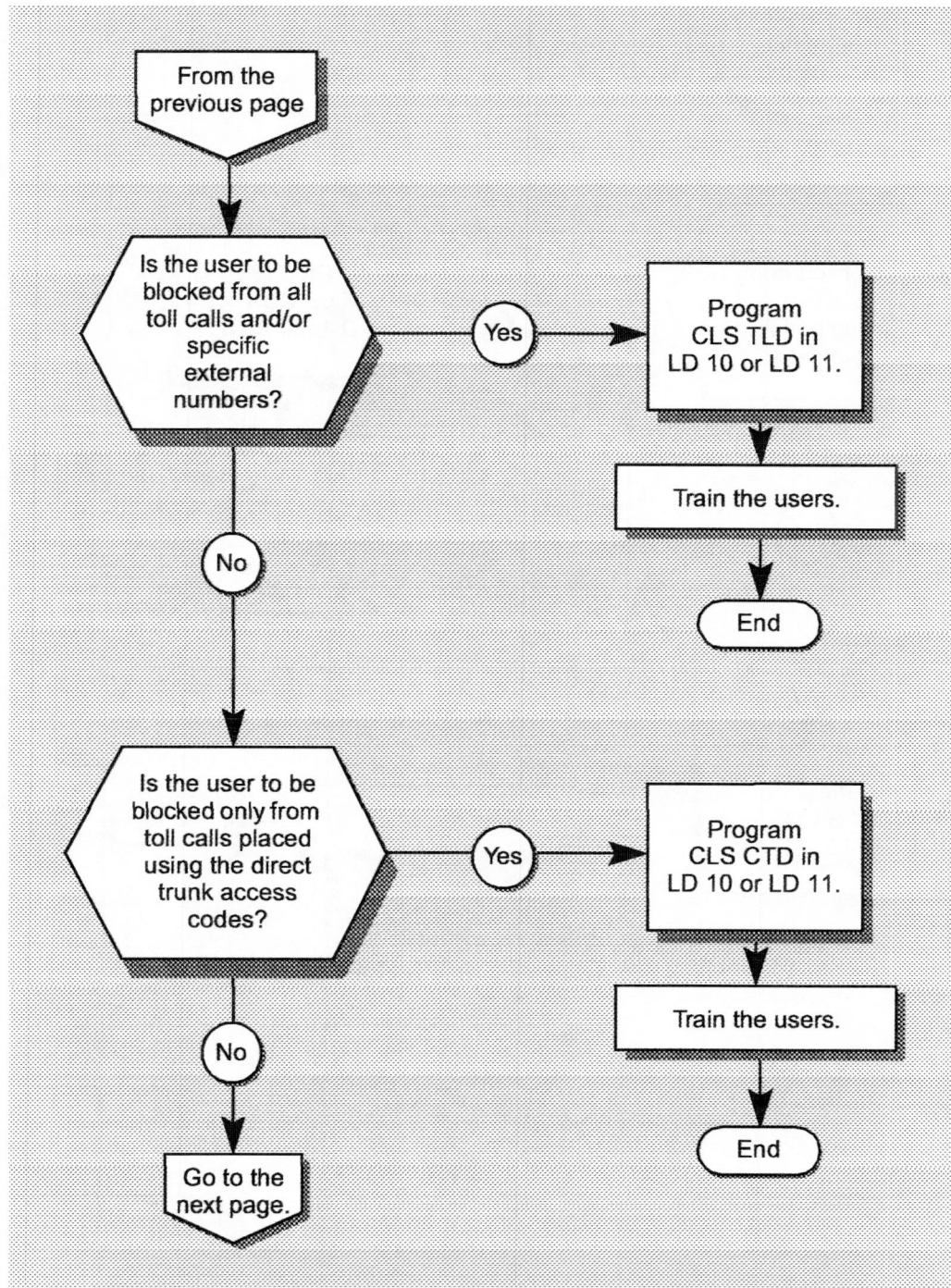
A flowchart follows which summarizes the implementation decisions and procedures.

A step-action table follows the flowchart. The table explains the programming steps necessary to implement this feature.

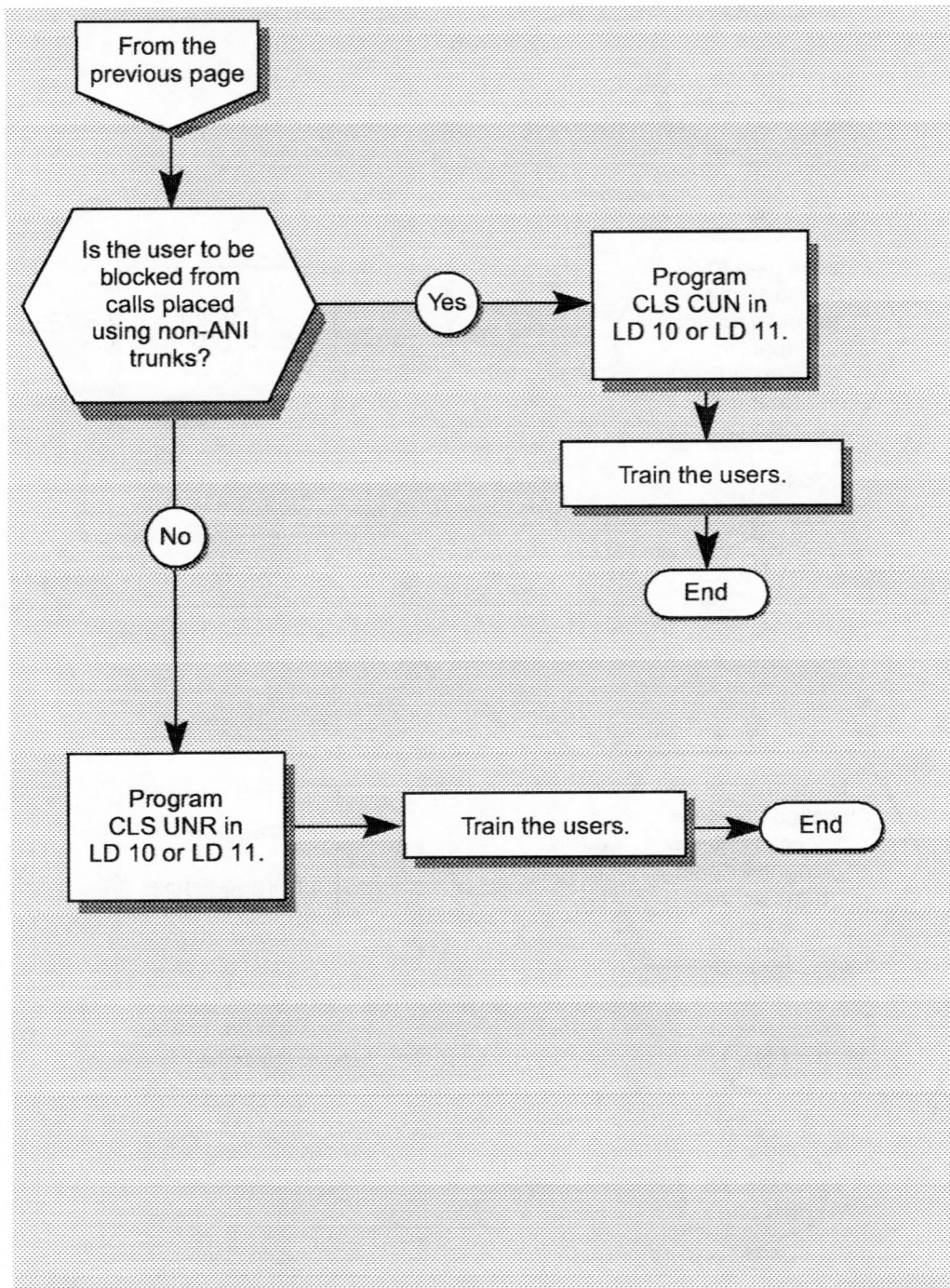
Access Restriction

Access Restriction



Access Restriction

Access Restriction



Access Restriction

The preceding material in this module contains essential information. You should be aware of this information before you proceed.

This step-action table covers the prompts related to the implementation or change of the Access Restriction feature only.



SCH codes can appear when you are programming. Refer to the *Basic programming instructions* module for more information.

STEP ACTION

1 Login.

For information on proper login procedures, refer to the *Basic programming instructions* module in this book. Check there also for the overlay program to use for the kind of telephone you are programming.

2 Choose your starting point from the choices below.

If	Do
new telephone	step 3
change to an existing telephone	step 4

3 Program the Access Restriction for a new telephone.

> LD 10 or > LD 11		
REQ	NEW	Program a new telephone
TYPE		Input correct type of 500, or digital, or SL-1-type telephone
TN	L S C U	Input the Terminal Number of the telephone (Loop number, Shelf number, Card number, Unit number)
program the basics...		Refer to Tasks 1–19 for information.

— continued —

Access Restriction

STEP ACTION

3 continued ...

carriage return until you see the prompt CLS, input one of the following responses:

CLS	UNR or <cr>	Unrestricted — default pre-Release 22
	CUN	Conditionally Unrestricted
	CTD	Conditionally Toll Denied — default Release22 and later
	TLD	Toll Denied
	SRE	Semi-Restricted
	FRE	Fully Restricted
	FR1	Fully Restricted 1
	FR2	Fully Restricted 2

Go to step 7.

4 Change the Class of Service of the telephone to a different Access Restriction type.

> LD 10 or > LD 11

REQ	CHG	Program a change on an existing telephone
TYPE		Input correct type of 500, digital, or SL-1-type telephone

TN	L S C U	Input the Terminal Number of the telephone (Loop number, Shelf number, Card number, Unit number)
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ECHG

— continued —

Access Restriction**STEP ACTION****4 continued ...**

If	Do
using "Easy Change "	Input YES and go to step 5.
not using "Easy Change"	Input NO or <cr> and go to step 6.
For more information on "Easy Change," refer to the <i>Basic programming instructions</i> module of this book.	

5 Program an "Easy Change" to an existing telephone to change the Access Restriction to a different type.

ITEM CLS	Input one of the following after CLS and a space: UNR CUN CTD TLD SRE FRE FR1 FR2 Refer to step 3 for the definitions of each one of these types.
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Go to step 7

— continued —

Access Restriction

STEP	ACTION
6	Program a change (not an "Easy Change") to an existing telephone to change the Access Restriction to a different type. carriage return until you see the prompt CLS CLS Input one of the following: - UNR - CUN - CTD - TLD - SRE - FRE - FR1 - FR2 Refer to step 3 for the definitions of each one of these types. Go to step 7.
7	Finish the overlay program. Carriage return until you see one of the following messages: U.data P.data small systems or MEM AVAIL: (U/P) USED:TOT: large systems When one of these messages appears, your Service Change has been entered into the memory. — continued —

Access Restriction

STEP ACTION

8 Check that the programming which you have just done is correct.

Place calls from the telephone. Verify that the only calls that are allowed from the telephone are those you want to allow.

If

Do

feature works properly

step 9

feature does not work properly

Refer to the information presented before the step-action table for further information on each Access Restriction type. Go to step 1.

9 Arrange for a data dump to be performed.

If

Do

you do not have access to LD 43

Contact your system supplier.

you have access to LD 43 step 10

10 Perform a data dump to permanently store the programming you have just completed.**CAUTION**

Check your maintenance agreement before working in LD 43.

Refer to the *Basic programming instructions* module in this book or refer to the *X11 input/output guide* for more information on LD 43.

> LD 43

. EDD <cr>

— continued —

Access Restriction

STEP	ACTION						
11	Verify that the dump was successful. TTY response: NO GO BAD DATA or DATA DUMP COMPLETE <table><tr><td>If</td><td>Do</td></tr><tr><td>data dump fails</td><td>Contact your system supplier.</td></tr><tr><td>data dump succeeds</td><td>step 12</td></tr></table>	If	Do	data dump fails	Contact your system supplier.	data dump succeeds	step 12
If	Do						
data dump fails	Contact your system supplier.						
data dump succeeds	step 12						
12	Terminate this overlay program. . ****						
13	Terminate this programming session. Log off. > LOGO						
14	You have completed the programming required to add or change the Access Restriction feature on a telephone.						
							